

ABSTRACT

5 Methods and apparatus are disclosed for dynamic allocation and management of
semaphores for accessing shared resources. These resources may be part of a computer or
communications system or a network, such as, but not limited to a disk drive, printer,
memory, file, database, code, data, etc., that can be allotted to a task while it is running.
In one implementation, a semaphore manager maintains a data structure of resources
having currently active resource requests and a list of each task requesting access and the
10 particular type of access requested. When an access request is received for the first time
for a resource, an entry is added to the data structure and access is authorized. Additional
requests to access the resource may be received while the resource is allocated. If a new
request for read access is received and the resource is currently under read access, access
is granted and an entry is added to the data structure. Otherwise, the resource is currently
15 unavailable, and access is either immediately denied or queued for possible future
allowance during a specified, predetermined or forever duration. In one implementation,
the semaphore manager uses semaphore primitives provided by an underlying operating
system and assigns each resource request a semaphore received from the operating
system. These semaphore values are maintained in the data structure, and may be used by
20 the semaphore manager for fulfilling or timing out queued access requests. In this
manner, access requests are made by a task based on an identifier of the resource (and not
an identifier of a semaphore), and semaphores are dynamically allocated at runtime and
only for those resources which are actually used.